

## PATENT ABSTRACTS OF JAPAN

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(54) WOVEN/KNITTED FABRIC WITH HIGH MOISTURE ABSORBABILITY/ RELEASABILITY AND THERMAL INSULATION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a woven/knitted fabric having high moisture absorbability/ releasability while having high-level thermal insulation.

SOLUTION: This fabric is obtained by combining moisture-absorbing/ releasing fibers represented by sheath-core conjugate multifilament yarns each composed of sheath constituent consisting of a polyamide and core constituent consisting of a polyalkylene oxide modified product or its blend with a polyamide, with sunlight selectively absorbing heat storage fibers; wherein the weight ratio for the above two kinds of fiber is (20:80) to (80:20).

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[The technical field to which invention belongs] this invention is excellent in moisture absorption and desorption characteristics and heat retaining property, and relates mainly to a sport garments field at useful woven knitted goods

[Description of the Prior Art] It was what has a fault that the garments of such a three-tiered structure are heavy and is bulky as a method of giving heat retaining property to the conventional sport garments by the three-tiered structure which made the cotton pad insert between frontal land and lining cloth although there is a thing using the air space of cotton pad. The sunlight selective-absorption accumulation fiber which transforms into heat energy the light energy which absorbed sunlight energy and was absorbed by the sheath-core type fiber which uses as a core part the kneading constituent of the fiber which made the transition-metals carbide represented by the zirconium carbide contain uniformly that this problem should be solved or this transition-metals carbide, and a thermoplastic synthetic-macromolecule object, and makes a thermoplastic synthetic-macromolecule object the sheath section is proposed. However, by exercising having a heat insulation effect, sweating was promoted more and there was a problem which produces MURE, smeariness, etc. On the other hand, although the textiles to which the compound union of sunlight selective-absorption accumulation fiber and the natural fiber excellent in moisture absorption and desorption characteristics was carried out are proposed, since it is inferior to quick-drying or abrasion resistance, the requests of the woven knitted goods having the heat retaining property and moisture absorption moisture desorption characteristic only by the synthetic fiber are mounting.

[Problem(s) to be Solved by the Invention] this invention aims at offering woven knitted goods excellent in moisture absorption and desorption characteristics and heat retaining property in view of such the present condition.

[Problem(s) to be Solved by the Invention] this invention has the next composition, in order to solve the above-mentioned technical problem.

(1) Woven knitted goods excellent in the moisture absorption and desorption characteristics characterized by being a textile which a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber are mixed, and changes, and the mixed use weight ratios of moisture-absorption-and-desorption-characteristics synthetic-fiber fiber and sunlight selective-absorption accumulation fiber being 20 / 80 - 80/20, and heat retaining property.

(2) Woven knitted goods excellent in the moisture absorption and desorption characteristics characterized by being a textile which a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber become from the compound thread mixed by doubling and twisting or the fluid confounding, and the mixed weight ratios of a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective absorption accumulation fiber being 20 / 80 - 80/20, and heat retaining property.

(3) Woven knitted goods excellent in the moisture absorption and desorption characteristics characterized by being a textile which consists of a sheath-core compound-die moisture-absorption-and-desorption-characteristics synthetic fiber which consisted of sheath components which consist of a heart component which a moisture-absorption-and-desorption-characteristics component turns into from the polyalkylene oxide denaturation object obtained by the reaction with polyalkylene oxide, a polyol, and an aliphatic diisocyanate compound, and the mixture of a polyamide, and a polyamide, and sunlight selective-absorption accumulation fiber, and the mixed weight ratios of a sheath-core compound-die moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber being 20 / 80 - 80/20, and

[Embodiments of the Invention] Hereafter, this invention is explained in detail. The sheath-core bicomponent fiber which the moisture-absorption-and-desorption-characteristics synthetic fiber as used in the field of this invention was a synthetic fiber which has advanced moisture absorption and desorption characteristics, and blended the compound and fiber-forming nature polymer which have a heart component or moisture absorption and desorption characteristics for the fiber which blended and carried out the silk manufacture of the compound and fiber-forming nature polymer which have moisture absorption and desorption characteristics as such a synthetic fiber, and the compound which has moisture absorption and desorption characteristics, used as the heart component, and carried out silk manufacture, using fiber-forming nature polymer as a sheath component is mentioned. As fiber-forming nature polymer, polyester such as polyester by which copolymerization was carried out in the 3rd component per polyamides, such as nylon 6, Nylon 66, the polyethylene terephthalate, and polyethylene terephthalate, a polybutylene terephthalate, and polypropylene terephthalate, etc. is mentioned here. Although it has moisture absorption and desorption characteristics good as a compound which has moisture absorption and desorption characteristics and there should be just little color change, the polyalkylene oxide denaturation object obtained by the reaction with polyalkylene oxide, a polyol, an aliphatic diisocyanate compound is used preferably. Although alicyclic group diisocyanate is also included as glycols, such as ethylene glycol, a diethylene glycol, and a propylene glycol, and aliphatic diisocyanate as a polyethylene oxide, polypropylene oxide and both copolymer, and a polyol here as polyalkylene oxide used as a raw material of this polyalkylene oxide denaturation object, dicyclohexyl methane -4, 4'-diisocyanate, 1, and 6-hexamethylene di-isocyanate etc. is mentioned. Yellowing resulting from the imido ring formed of the resonating structure of an isocyanate machine and a ring which are seen when such a polyalkylene oxide denaturation object was used as a compound which has moisture absorption and desorption characteristics and an aromatic isocyanate compound is used is suppressed, even if it uses it for a long period of time, it is lost that fiber yellows, and it can be considered as the bicomponent fiber excellent in weatherability. As for the content of the polyalkylene oxide denaturation object as a compound which has the moisture absorption and desorption characteristics of the moisture-absorption-and-desorption-characteristics synthetic fiber in this invention, it is desirable that it is in 0.5 - 60% of the weight of the range. When the target moisture absorption and desorption characteristics may not be obtained for the content of a polyalkylene oxide denaturation object at less than 0.5 % of the weight and content exceeds 60 % of the weight, a possibility that a problem may arise is in silk manufacture nature. Moreover, although the sheath-core compound ratio in the case of considering as a sheath-core bicomponent fiber changes with polymer to be used, when it is desirable that it is in the range of 15 / 85 - 85/15 by the weight ratio and there are few rates of a heart component than this, it is inferior to moisture absorption and desorption characteristics, and when there are many heart components, a possibility that a problem may arise is in silk manufacture nature. Next, the sunlight selective-absorption accumulation fiber as used in the field of this invention is a bicomponent fiber obtained by blending the carbide impalpable powder and fiber-forming nature polymer of transition metals belonging to the periodic-law IV group which is a sunlight selection accumulation agent, and carrying out melt spinning. As a carbide impalpable powder of the transition metals belonging to the periodic-law IV group this sunlight selective-absorption accumulation fiber is made to contain, a zirconium carbide, a hafnium carbide, a titanium carbide, etc. are mentioned. It is desirable that a mean particle diameter is 5 micrometers or less, and since the particle size of such a carbide impalpable powder may produce problems, such as fall of the spinning nature by blinding, thread breakage, etc. of a spinning nozzle in a spinning process, and thread breakage in an extension process, when a mean particle diameter exceeds 5 micrometers, it is not desirable. Moreover, it is desirable that it is in 1.5 - 20% of the weight of the range as an addition of the carbide impalpable powder of the transition metals belonging to the periodic-law IV group sunlight selective-absorption accumulation fiber is made to contain. If sunlight selective-absorption nature is not obtained as the addition of a carbide impalpable powder is less than 1.5 % of the weight, but a heat insulation effect is spoiled and 20 % of the weight is exceeded, since the fall of strong ductility etc. is produced, it is not desirable. As fiber-forming nature polymer sunlight selective-absorption accumulation fiber is made to contain Polyamides, such as nylon 6 and Nylon 66, a polyethylene terephthalate, The polyester by which copolymerization was carried out in the 3rd component per polyethylene terephthalate, Polyester such as a polybutylene terephthalate and polypropylene terephthalate, etc. is mentioned. It can blend with the carbide impalpable powder belonging to a periodic-law IV group, and can allot a core part, and sunlight selective-absorption accumulation fiber can be obtained by allotting and carrying out compound spinning of what was selected from these fiber-forming nature polymer to the sheath section. A moisture-absorption-and-desorption-characteristics component of this invention Polyalkylene oxide, The above-mentioned moisture-absorption-and-desorption-characteristics synthetic

fiber represented by the sheath-core bicomponent fiber which consisted of sheath components which consist of a heart component which consists of a polyalkylene oxide denaturation object obtained by the reaction with a polyol and an aliphatic diisocyanate compound, and mixture of a polyamide, and a polyamide, Although it is the textile which sunlight selective-absorption accumulation fiber is mixed and changes, the mixed weight ratios of a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber contained in a textile at this time must be 20 / 80 - 80/20. Moisture absorption and desorption characteristics decrease that the mixed weight ratio of this moisture-absorption-and-desorption-characteristics synthetic fiber is less than 20, and it becomes impossible to obtain heat retaining property as the mixed weight ratio of sunlight selective-absorption accumulation fiber is less than 20 conversely. The method of performing the volume union by meanses, such as a method of doubling and twisting both as the mixed use method of a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber, the method of lengthening and arranging both, or attaching the Itonaga difference, and supplying and carrying out a fluid confounding to air disturbance equipment, a method of using another side for the warp of textiles for one side as the woof, warping, and an array at the time of \*\*\*\*, and on intersection etc. is employable. If it is not the above-mentioned mixed weight ratio in which method, the effect of heat retaining property and moisture absorption and desorption characteristics cannot be acquired. Moreover although a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber are mixed, and the fiber of further others may be made to mix as long as it is the above-mentioned mixed weight ratio, it is remarkable and the thing for which moisture-absorption-and-desorption-characteristics ability and heat retention are not reduced and which carry out a mixture ratio is required.

[Function] Since the carbide of the transition metals belonging to the periodic-law IV group used for the sunlight selective-absorption accumulation fiber which constitutes the textile of this invention has the capacity to convert and emit a light energy with a wavelength of 0.3 micrometers - 2 micrometers which is the principal component of sunlight to heat energy with a wavelength of 2 micrometers - 20 micrometers, and to reflect the heat energy of 10 micrometer good heat retaining property is shown. However, in order to promote sweating by exercising, having a heat insulation effect, the field of the amenity was not enough by MURE, smeariness, etc. Like this invention, a moisture-absorption-and-desorption-characteristics component is a reaction with polyalkylene oxide, a polyol, and an aliphatic diisocyanate compound. The moisture-absorption-and-desorption-characteristics synthetic fiber represented by the sheath-core bicomponent fiber which consisted of sheath components which consist of a heart component which consists of a polyalkylene oxide denaturation object obtained and mixture of a polyamide, and a polyamide, If it is the textile which sunlight selective-absorption accumulation fiber is mixed and changes, and it constitutes so that the mixed weight ratio of a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber may be set to 20 / 80 - 80/20 Sunlight can become weak, or an accumulation heat insulation effect can be demonstrated at the time of sunset, and with the advanced moisture absorption and desorption characteristics of a moisture-absorption-and-desorption-characteristics synthetic fiber, since a \*\*\*\*\* function is demonstrated at the time of the bottom of the influence of a heat insulation effect, or movement, a comfortable feeling can be obtained, without sensing MURE and smeariness.

[Example] Next, an example explains this invention concretely. Measurement evaluation of the performance in an example was performed by the following method.

(1) Dry a moisture-absorption-and-desorption-characteristics sample at 105 degrees C for 2 hours, and it is a weight W0. Shigekazu Ushiro W1 who did gas conditioning under conditions of the temperature of 25 degrees C, and 60% relative humidity after measuring It measures and is the initial moisture regain M0 by the following formula (b). It asks. Next, weight W2 after making this sample absorb moisture for 24 hours under conditions of the temperature of degrees C, and 90% of relative humidity It measures and is a moisture regain M1. It computes by the following form (b). Then, weight W3 after leaving this sample for further 24 hours under conditions of the temperature of 25 degree C, and 60% of relative humidity It measures and is the moisture regain M2 after \*\*\*\*. It computes by the following formula (c).

$$M0 (\%) = [(W1 - W0) / W0] \times 100 \quad (b)$$

$$M1 (\%) = [(W2 - W0) / W0] \times 100 \quad (b)$$

$$M2 (\%) = [(W3 - W0) / W0] \times 100 \quad (c)$$

(2) the constant temperature of the heat-retaining-property temperature of 20 degrees C, and 65% of humidity -- in the interior of a room of constant humidity, using 100W white Mitsuhara for photographs as an energy source, after

irradiating a light for 10 minutes at a sample, the light was turned off, and it was left for 5 minutes under the present circumstances, the skin temperature of the sample of before light irradiation, after [ of light irradiation ] 10 minutes, and putting-out-lights 5-minute Ushiro -- a thermostat -- pure -- it measured in JTG-4200 (the JEOL Co., Ltd. make, infrared sensor)

Use as a heart component mixture which blended the polyalkylene denaturation object (35g of 1g water absorbing power) 15 weight section which is the reactant of 85 weight sections, polyethylene-oxide, 1, and 4-butanediol and dicyclohexyl methane 4, and 4' diisocyanate about example 1 nylon 6, and let nylon 6 be a sheath component.

Compound spinning was carried out by the weight ratios 50/50 of a heart component / sheath component, and the sheath-core compound-die moisture-absorption-and-desorption-characteristics synthetic fiber of 70 deniers / 24 filament was obtained. On the other hand, 5 weight sections were combined with 95 weight sections for zirconium-carbide powder with a particle size of 10 micrometers or less, nylon 6 was used as the heart component at them, compound spinning was carried out by having used nylon 6 as the sheath component by the weight ratios 50/50 of a heart component / sheath component, and the sunlight selective-absorption accumulation fiber of 70 deniers / 24 filament was obtained. Warp and sunlight selective-absorption accumulation fiber are used for the woof for the obtained moisture-absorption-and-desorption-characteristics synthetic fiber, and it is 140/an inch warp density and 60/inch woof density. Weaving of the plain weave fabric is carried out, and they are after refinement and presetting a Suminol fast yellow 2GP2(Sumitomo Chemical Co., Ltd. make, acid dye) %owf by the conventional method about t gray goods. By dyeing, sunlight selective-absorption accumulation fiber obtained [ the ratio of the moisture-absorpti and-desorption-characteristics synthetic fiber occupied in textiles ] the \*\*\*\*\* heat-retaining-property textiles of 30% of this invention 70%.

Sunlight selective-absorption accumulation fiber obtained [ the ratio of the moisture-absorption-and-desorption-characteristics synthetic fiber which are made sunlight selective-absorption accumulation fiber as warp, and a moistu absorption-and-desorption-characteristics synthetic fiber is made into the woof in example 2 example 1, and also is occupied in textiles by the same method as an example 1 ] the \*\*\*\*\* heat-retaining-property textiles of 70% of this invention 30%.

The moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulatio fiber which were obtained in example 3 example 1 Supply air disturbance equipment equipped with interchange race JD-1, and fluid confounding processing is performed. the conditions of yarn speed 600 m/min, pneumatic pressure 1 kg/m2, and 2.0% of rates of overfeeding -- lengthening -- arranging -- the E. I. du Pont de Nemours make -- After considering as the compound commingled yarn of a sheath-core bicomponent fiber and sunlight selective-absorption accumulation fiber, it is used for warp and the woof and weaving of the plain weave fabric is carried out by making both warp density and woof density into 100/an inch, and it is a conventional method about the gray goods. After refinement and presetting and Suminol fastyellow 2GP2(Sumitomo Chemical Co., Ltd. make, acid dye) %owf By dyeing, sunlight selective-absorption accumulation fiber obtained [ the ratio of the moisture-absorption-and-desorpti characteristics synthetic fiber occupied in textiles ] the \*\*\*\*\* heat-retaining-property textiles of 50% of this inventi 50%.

In example 4 example 3, the ratio of the moisture-absorption-and-desorption-characteristics synthetic fiber which the woof is considered as the compound commingled yarn of the moisture-absorption-and-desorption-characteristics synthetic fiber of an example 3 and sunlight selective-absorption accumulation fiber and the array of 1:1 of 140 deni of nylon 6 filament yarn and 48 usual filament, and also is occupied in textiles by the same method as an example 3 obtained the \*\*\*\*\* heat-retaining-property textiles textile of this invention whose ratio of sunlight selective-absorption accumulation fiber is 38% 38%.

The textiles of the example of comparison were obtained by the same method as an example 1 except using only the sunlight selective-absorption accumulation fiber used in example of comparison 1 example 1 for warp and the woof. The textiles of the example of comparison were obtained by the same method as an example 1 except using only the moisture-absorption-and-desorption-characteristics synthetic fiber used in example of comparison 2 example 1 for w and the woof.

The ratio of the moisture-absorption-and-desorption-characteristics synthetic fiber occupied on textiles obtained the textiles of the example of comparison which is 82% about sunlight selective-absorption accumulation fiber 18% like the example 1 except making warp density into 160/an inch, and making woof density into 40/an inch in example of comparison 3 example 1.

The ratio of the moisture-absorption-and-desorption-characteristics synthetic fiber occupied on textiles obtained the textiles of the example of comparison which is 18% about sunlight selective-absorption accumulation fiber 82% like the example 1 except making warp density into 160/an inch, and making woof density into 40/an inch in example of comparison 4 example 2.

The ratio of the sheath-core bicomponent fiber occupied in textiles obtained the textiles of the example of comparison whose sunlight selective-absorption accumulation fiber is 13% 13% like the example 4 except using warp as 140 deniers of nylon 6 filament yarn, and 48 filament in example of comparison 5 example 4. The evaluation result of the acquired examples 1-4 and the examples 1-5 of comparison is combined, and is shown in Table 1.

[Table 1]

		実 施 例				比 較 例				
		1	2	3	4	1	2	3	4	5
繊維A/繊維B使用割合		70/30	30/70	50/50	38/38	100/0	0/100	18/82	82/18	13/13
吸放湿性 (%)	M <sub>0</sub>	3.0	2.7	3.0	3.1	3.3	1.9	2.1	3.8	1.9
	M <sub>1</sub>	6.9	5.2	6.5	5.6	8.7	2.8	3.0	7.8	2.2
	M <sub>2</sub>	3.4	3.1	3.3	3.2	4.0	2.6	2.4	3.9	2.3
保湿性 (℃)	ライト照射前	20.3	20.2	20.1	20.1	20.1	20.1	20.2	20.3	20.2
	341照射10分後	25.1	25.8	25.5	24.9	22.0	26.1	26.4	23.0	22.4
	341消灯5分後	23.2	24.2	23.6	23.0	21.6	24.2	24.1	21.8	20.5

(繊維A：吸放湿性合成繊維、繊維B：太陽光選択吸収蓄熱繊維)

The textiles of examples 1-4 holding an advanced heat insulation effect a passage clear from Table 1, it had moisture absorption and desorption characteristics, and was suitable as a comfortable garments textile. On the other hand, since sunlight selective-absorption accumulation fiber was not used by the textile textile of only the moisture-absorption-a desorption-characteristics synthetic fiber to which the example 1 of comparison used a polyalkylene oxide denaturat object and mixture of nylon 6 as the heart, and used nylon 6 as the sheath, moisture absorption and desorption characteristics were what cannot obtain the heat retaining property of a good thing. Moreover, since the compound which has a polyalkylene oxide denaturation object, i.e., moisture absorption and desorption characteristics, did not exist, the example 2 of comparison was that in which accumulation heat retaining property is inferior to the moisture absorption and desorption characteristics of a good thing. Although both a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber were used in the examples 3 and 4 of comparison, it was what it is inferior to moisture absorption and desorption characteristics since the example 3 of comparison has few moisture-absorption-and-desorption-characteristics synthetic fibers, i.e., the mixed weight ratio the compound which has moisture absorption and desorption characteristics, occupied in a textile, and is inferior to h retaining property since the example 4 of comparison has few mixed weight ratios of the sunlight selective-absorptio accumulation fiber occupied in a textile. In the example 5 of comparison, since there were few both mixed weight ratios of a moisture-absorption-and-desorption-characteristics synthetic fiber and sunlight selective-absorption accumulation fiber, it was that in which moisture absorption and desorption characteristics and heat retaining property are inferior.

[Effect of the Invention] According to this invention, having advanced heat retaining property, the woven-knitted-goods textile which has the outstanding moisture absorption and desorption characteristics which are not in the conventional synthetic fiber fabric can be obtained, and garments excellent in the amenity can be obtained.

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最終頁に続く

(54) 【発明の名称】 吸放湿性、保温性に優れた繊維物

(57) 【要約】

【課題】 高度な保温性を有しながら、優れた吸放湿性を有する繊維物布帛を提供する。

【解決手段】 ポリアルキレンオキサイド変性物又は前記変性物とポリアミドの混合物から成る芯成分とポリアミドから成る鞘成分より構成された芯鞘複合糸に代表される吸放湿性繊維と、太陽光選択吸収蓄熱繊維が混用されて成る布帛であって、吸放湿性繊維と太陽光選択吸収蓄熱繊維の混合重量比率が20/80～80/20であることを特徴とする吸放湿性、保温性に優れた繊維物布帛。

(2)

特開2000-160450

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【特許請求の範囲】

【請求項1】 吸放湿性合成繊維と太陽光選択吸収蓄熱繊維が混用されてなる布帛であって、吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混用重量比率が20/80～80/20であることを特徴とする吸放湿性、保温性に優れた繊維物。

【請求項2】 吸放湿性合成繊維と太陽光選択吸収蓄熱繊維が台燃または流体交絡によって混合された複合糸よりなる請求項1記載の吸放湿性、保温性に優れた繊維物。

【請求項3】 吸放湿性合成繊維がポリアルキレンオキサイド、ポリオール及び脂肪族ジイソシアネート化合物との反応によって得られるポリアルキレンオキサイド変性物とポリアミドの混合物からなる芯成分とポリアミドからなる鞘成分で構成された芯鞘複合型吸放湿性合成繊維である請求項1または請求項2記載の吸放湿性、保温性に優れた繊維物。

【発明の詳細な説明】

【発明の属する技術分野】本発明は、吸放湿性、保温性に優れ、主としてスポーツ衣料分野に有用な繊維物に関するものである。

【従来の技術】従来のスポーツ衣料に保温性を付与する方法として、表地と裏地との間に中綿を挿入させた3層構造により、中綿の空気層を利用するものがあるが、このような3層構造の衣料は、重くてかさばるとの欠点を有するものであった。この問題を解消すべく、炭化シルコニウムに代表される遷移金属炭化物を均一に含有させた繊維、あるいは該遷移金属炭化物と熱可塑性合成高分子体との混練組成物を芯部とし、熱可塑性合成高分子体を鞘部とする芯鞘型繊維により、太陽光エネルギーを吸収し、吸収した光エネルギーを熱エネルギーに変換する太陽光選択吸収蓄熱繊維が提案されている。しかしながら保温効果を有しつつ運動を行うことによって、より発汗を促進し、ムレ、ベタツキ等生じる問題があった。これに対し、太陽光選択吸収蓄熱繊維と吸放湿性に優れた天然繊維を複合交絡させた繊維物が提案されているが、速乾性及び耐摩耗性に劣るため、合成繊維のみによる保温性と吸放湿性を併せ持つ繊維物の要望が高まっている。

【発明が解決しようとする課題】本発明は、このような現状に鑑みて、吸放湿性、保温性に優れた繊維物を提供することを目的とするものである。

【発明が解決しようとする課題】本発明は、上記の課題を解決するために、次の構成を有するものである。

(1) 吸放湿性合成繊維と太陽光選択吸収蓄熱繊維が混用されて成る布帛であって、吸放湿性合成繊維繊維と太陽光選択吸収蓄熱繊維の混用重量比率が20/80～80/20であることを特徴とする吸放湿性、保温性に優れた繊維物。

(2) 吸放湿性合成繊維と太陽光選択吸収蓄熱繊維が台燃または流体交絡によって混合された複合糸よりなる布

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帛であって、吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混合重量比率が20/80～80/20であることを特徴とする吸放湿性、保温性に優れた繊維物。

(3) 吸放湿性成分がポリアルキレンオキサイド、ポリオール及び脂肪族ジイソシアネート化合物との反応によって得られるポリアルキレンオキサイド変性物とポリアミドの混合物からなる芯成分とポリアミドからなる鞘成分で構成された芯鞘複合型吸放湿性合成繊維と、太陽光選択吸収蓄熱繊維よりなる布帛であって、芯鞘複合型吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混合重量比率が20/80～80/20であることを特徴とする吸放湿性、保温性に優れた繊維物。

【発明の実施の形態】以下、本発明について詳細に説明する。本発明でいう吸放湿性合成繊維とは、高度な吸放湿性を有する合成繊維であって、このような合成繊維としては、吸放湿性を有する化合物と繊維形成性ポリマーとをブレンドして製糸した繊維、吸放湿性を有する化合物を芯成分あるいは吸放湿性を有する化合物と繊維形成性ポリマーとをブレンドして芯成分とし、鞘成分として繊維形成性ポリマーを用いて製糸した芯鞘複合繊維が挙げられる。ここで繊維形成性ポリマーとしては、ナイロン6、ナイロン66等のポリアミド、ポリエチレンテレフタレート、ポリエチレンテレフタレート単位に第3成分を共重合させたポリエステル、ポリブチレンテレフタレート、ポリプロピレンテレフタレート等のポリエステル等が挙げられる。吸放湿性を有する化合物としては、良好な吸放湿性を有し、色調変化の少ないものであればよいが、ポリアルキレンオキサイド、ポリオール及び脂肪族ジイソシアネート化合物との反応によって得られるポリアルキレンオキサイド変性物が好ましく用いられる。このポリアルキレンオキサイド変性物の原料として用いられるポリアルキレンオキサイドとしてはポリエチレンオキサイド、ポリプロピレンオキサイドおよび両者の共重合体、ポリオールとしてはエチレングリコール、ジエチレングリコール、プロピレングリコールなどのグリコール類、脂肪族ジイソシアネートとしては、ここでは脂環族ジイソシアネートも含むが、ジシクロヘキシルメタン-4, 4'-ジイソシアネート、1, 6-ヘキサメチレンジイソシアネートなどが挙げられる。このようなポリアルキレンオキサイド変性物を吸放湿性を有する化合物として用いると、芳香族イソシアネート化合物を用いた場合に見られるようなイソシアネート基と芳香環との共鳴構造により形成されるイミド環に起因する黄変が抑制され、長期間使用しても繊維が黄変することがなくなり、耐候性に優れた複合繊維とすることができ。本発明における吸放湿性合成繊維の吸放湿性を有する化合物としてのポリアルキレンオキサイド変性物の含有率は、0.5～60重量%の範囲にあることが好ましい。ポリアルキレンオキサイド変性物の含有率が0.5重量%未満では目的とする吸放湿性が得られない場合があ

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り、含有率が60重量%を越えると、製糸性に問題が生じるおそれがある。また芯鞘複合繊維とする場合の芯鞘複合比は使用するポリマー等により異なるが、重量比で15/85~85/15の範囲にあることが好ましく、これよりも芯成分の割合が少ないと、吸放湿性に劣り、芯成分が多いと製糸性に問題が生じるおそれがある。次に本発明でいう太陽光選択吸収蓄熱繊維とは、太陽光選択吸収蓄熱剤である周期律IV族に属する遷移金属の炭化物微粉末と繊維形成性ポリマーとをブレンドし、溶融紡糸して得られる複合繊維である。この太陽光選択吸収蓄熱繊維に含有せしめる周期律IV族に属する遷移金属の炭化物微粉末としては、炭化ジルコニウム、炭化ハフニウム、炭化チタン等が挙げられる。このような炭化物微粉末の粒径は、平均粒径が5μm以下であることが好ましく、平均粒径が5μmを越えると、紡糸工程での紡糸ノズルの目詰まりや糸切れ等による紡糸性の低下や延伸工程での糸切れ等の問題を生じることがあるので好ましくない。また太陽光選択吸収蓄熱繊維に含有せしめる周期律IV族に属する遷移金属の炭化物微粉末の添加量としては1.5~20重量%の範囲にあることが好ましい。炭化物微粉末の添加量が1.5重量%未満であると太陽光選択吸収性が得られず保温効果を損ない、20重量%を越えると、強伸度の低下等を生じさせるため好ましくない。太陽光選択吸収蓄熱繊維に含有せしめる繊維形成性ポリマーとしては、ナイロン6、ナイロン66等のポリアミド、ポリエチレンテレフタレート、ポリエチレンテレフタレート単位に第3成分を共重合されたポリエステル、ポリブチレンテレフタレート、ポリプロピレンテレフタレート等のポリエステル等が挙げられ、周期律IV族に属する炭化物微粉末とブレンドして芯部に配し、これらの繊維形成性ポリマーの中から選定したものを鞘部に配して複合紡糸することによって太陽光選択吸収蓄熱繊維を得ることができる。本発明は、吸放湿性成分がポリアルキレンオキシド、ポリオール及び脂肪族ジイソシアネート化合物との反応によって得られるポリアルキレンオキシド変性物とポリアミドの混合物からなる芯成分とポリアミドからなる鞘成分で構成された芯鞘複合繊維に代表される上述の吸放湿性合成繊維と、太陽光選択吸収蓄熱繊維が混用されて成る布帛であるが、このとき布帛中に含まれる吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混合重量比率が20/80~80/20でなければならない。この吸放湿性合成繊維の混合重量比率が20未満であると、吸放湿性が少なくなり、逆に太陽光選択吸収蓄熱繊維の混合重量比率が20未満であると保温性を得ることができなくなる。吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混用方法としては、両者を台燃\*

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\*する方法、両者を引き揃えあるいは糸長差を付けて空気攪乱装置に供給して流体交絡させる方法、一方を織物の経糸に、他方を緯糸として用いる方法、整経や製布時における配列等の手段による交織、交編を行う方法等を採用することができる。いずれの方法においても上記の混合重量比率でなければ保温性と吸放湿性の効果を得ることができない。また吸放湿性合成繊維と太陽光選択吸収蓄熱繊維を混用し、上記の混合重量比率であれば、さらに他の繊維を混用させてもよいが、若しくは、吸放湿性能と保温性を低下させない混用率することが必要である。

【作用】本発明の布帛を構成する太陽光選択吸収蓄熱繊維に用いる周期律IV族に属する遷移金属の炭化物は、太陽光の主成分である波長0.3μm~2μmの光エネルギーを波長2μm~20μmの熱エネルギーに転換、放射し10μmの熱エネルギーを反射する能力を持っているため、良好な保温性を示す。しかしながら、保温効果を有しつつ、運動を行うことにより発汗を促進させるため、ムレ、ベタツキ等により、快適性の面では十分なものではなかった。本発明のごとく、吸放湿性成分がポリアルキレンオキシド、ポリオール及び脂肪族ジイソシアネート化合物との反応によって得られるポリアルキレンオキシド変性物とポリアミドの混合物からなる芯成分とポリアミドからなる鞘成分で構成された芯鞘複合繊維に代表される吸放湿性合成繊維と、太陽光選択吸収蓄熱繊維が混用されて成る布帛であって、吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混合重量比率が20/80~80/20となるように構成すると、太陽光が弱くなったり、日没時においても蓄熱保温効果を発揮することができ、吸放湿性合成繊維の高度な吸放湿性により、保温効果の影響下や運動時においても吸放湿機能を発揮するため、ムレ、ベタツキを感じることなく快適感を得ることができる。

【実施例】次に本発明を実施例によって具体的に説明をする。実施例における性能の測定評価を次の方法で行った。

#### (1) 吸放湿性

試料を105℃で2時間乾燥して重量 $W_0$ を測定した後、温度25℃、相対湿度60%の条件下で調湿した後、重量 $W_1$ を測定し、下記式(イ)により初期水分率 $M_1$ を求め、次にこのサンプルを温度34℃、相対湿度90%の条件下で24時間吸湿させた後、重量 $W_2$ を測定し、水分率 $M_2$ を下記式(ロ)により算出する。続いて、このサンプルを温度25℃、相対湿度60%の条件下でさらに24時間放湿した後、重量 $W_3$ を測定し、放湿後の水分率 $M_3$ を下記式(ハ)により算出する。

$$M_1 (\%) = [(W_1 - W_0) / W_0] \times 100 \quad (イ)$$

$$M_2 (\%) = [(W_2 - W_0) / W_0] \times 100 \quad (ロ)$$

$$M_3 (\%) = [(W_3 - W_0) / W_0] \times 100 \quad (ハ)$$

#### (2) 保温性

50 温度20℃、湿度65%の恒温恒湿の室内において、エ

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エネルギー源として写真用100W白色光源を用い、試料にライトを10分間照射した後ライトの電源を切り、5分間放置した。この際、ライト照射前、ライト照射10分後、消灯5分後の試料の表面温度をサーモピエJTG-4200（日本電子株式会社製、赤外センサー）にて測定した。

#### 実施例1

ナイロン6を85重量部とポリエチレンオキサイド、1,4-ブタンジオールおよびジシクロヘキシルメタン4,4'-ジイソシアネートの反応物であるポリアルキレン変性物（1gの水吸収能35g）15重量部とをブレンドした混合物を芯成分とし、ナイロン6を鞘成分として、芯成分/鞘成分の重量比50/50で複合紡糸し、70デニール/24フィラメントの芯鞘複合型吸放湿性合成繊維を得た。一方ナイロン6を95重量部に粒径10μm以下の炭化シリコン粉末を5重量部を配合させて芯成分とし、ナイロン6を鞘成分として、芯成分/鞘成分の重量比50/50で複合紡糸し、70デニール/24フィラメントの太陽光選択吸収蓄熱繊維を得た。得られた吸放湿性合成繊維を経糸、太陽光選択吸収蓄熱繊維を緯糸に使用し、経糸密度140本/吋、緯糸密度60本/吋として、平織物を製織し、その生機を常法により精錬、プレセット後、Summol fast yellow 2GP（住友化学株式会社製、酸性染料）2%owfにて染色することにより、織物中に占める吸放湿性合成繊維の比率が70%、太陽光選択吸収蓄熱繊維が30%の本発明の吸放湿保温性織物を得た。

#### 実施例2

実施例1において太陽光選択吸収蓄熱繊維を経糸、吸放湿性合成繊維を緯糸とする他は、実施例1と同一の方法により織物中に占める吸放湿性合成繊維の比率が30%、太陽光選択吸収蓄熱繊維が70%の本発明の吸放湿保温性織物を得た。

#### 実施例3

実施例1において得た吸放湿性合成繊維と太陽光選択吸収蓄熱繊維を、糸速600m/min、空気圧1.5Kg/m<sup>2</sup>、オーバーフィード率2.0%の条件で引き揃えてデュボン製インターレーサーJD-1を備えた空気攪乱装置に供給して流体交絡処理を施し、芯鞘複合繊維と太陽光選択吸収蓄熱繊維の複合混雑糸とした後、経糸及び緯糸に使用し、経糸密度と緯糸密度を共に100本

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／吋として、平織物を製織し、その生機を常法により精錬、プレセット後、Summol fast yellow 2GP（住友化学株式会社製、酸性染料）2%owfにて染色することにより、織物中に占める吸放湿性合成繊維の比率が50%、太陽光選択吸収蓄熱繊維が50%の本発明の吸放湿保温性織物を得た。

#### 実施例4

実施例3において、緯糸を実施例3の吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の複合混雑糸と通常のナイロン6フィラメント糸140デニール/48フィラメントの1:1の配列とする他は、実施例3と同一の方法により織物中に占める吸放湿性合成繊維の比率が38%、太陽光選択吸収蓄熱繊維の比率が38%の本発明の吸放湿保温性織物布帛を得た。

#### 比較例1

実施例1において用いた太陽光選択吸収蓄熱繊維のみを経糸、緯糸に使用すること以外は実施例1と同一の方法により比較例の織物を得た。

#### 比較例2

実施例1において用いた吸放湿性合成繊維のみを経糸、緯糸に使用すること以外は実施例1と同一の方法により比較例の織物を得た。

#### 比較例3

実施例1において経糸密度を160本/吋、緯糸密度を40本/吋とすること以外は実施例1と同様にして、織物に占める吸放湿性合成繊維の比率が18%、太陽光選択吸収蓄熱繊維を82%である比較例の織物を得た。

#### 比較例4

実施例2において経糸密度を160本/吋、緯糸密度を40本/吋とすること以外は実施例1と同様にして、織物に占める吸放湿性合成繊維の比率が82%、太陽光選択吸収蓄熱繊維を18%である比較例の織物を得た。

#### 比較例5

実施例4において経糸をナイロン6フィラメント糸140デニール/48フィラメントとすること以外は実施例4と同様にして、織物中に占める芯鞘複合繊維の比率が13%、太陽光選択吸収蓄熱繊維が13%である比較例の織物を得た。得られた実施例1～4及び比較例1～5の評価結果を併せて表1に示す。

【表1】

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		実 施 例				比 較 例				
		1	2	3	4	1	2	3	4	5
繊維A/繊維B(重量比)		70/30	55/45	55/45	32/68	100/0	0/100	13/87	82/18	13/87
吸放湿性 (%)	M <sub>0</sub>	2.0	2.7	2.9	3.1	2.3	1.9	2.1	2.8	1.9
	M <sub>1</sub>	5.9	5.2	5.5	5.6	8.7	2.8	3.9	7.8	2.2
	M <sub>2</sub>	3.4	3.1	2.9	3.2	4.0	2.6	2.4	2.9	2.3
保熱性 (℃)	ライト照射前	20.5	20.2	20.1	20.1	20.1	20.1	20.3	20.3	20.2
	ライト照射10分後	25.1	25.8	25.5	24.9	22.0	28.1	25.4	28.0	22.4
	ライト照射5分後	23.2	24.2	23.6	23.6	21.6	24.2	24.1	21.8	20.5

(繊維A:吸放湿性合成繊維、繊維B:太陽光選択吸収蓄熱繊維)

表1から明らかな通り、実施例1～4の繊維は高度な保温効果を保持しつつ、吸放湿性を有しており、快適衣料布帛として好適なものであった。一方、比較例1はポリアルキレンオキサライド変性物とナイロン6の混合物を芯、ナイロン6を鞘とした吸放湿性合成繊維のみの繊維布帛で太陽光選択吸収蓄熱繊維を使用していないため、吸放湿性が良好なものの、保温性を得ることができないものであった。また比較例2はポリアルキレンオキサライド変性物すなわち吸放湿性を有する化合物が存在しないため、蓄熱保温性が良好なものの、吸放湿性に劣るものであった。比較例3及び4においては、吸放湿性合成繊維と太陽光選択吸収蓄熱繊維を両方使用しているもの \*

\*の、比較例3は布帛中に占める吸放湿性合成繊維すなわち、吸放湿性を有する化合物の混合重量比率が少ないため吸放湿性に劣り、比較例4は布帛中に占める太陽光選択吸収蓄熱繊維の混合重量比率が少ないため保温性に劣るものであった。比較例5においては、吸放湿性合成繊維と太陽光選択吸収蓄熱繊維の混合重量比率が共に少ないため、吸放湿性、保温性共に劣るものであった。

【発明の効果】本発明によれば、高度な保温性を有しながら、従来の合成繊維繊維にはない優れた吸放湿性を有する繊維物布帛を得ることができ、快適性に優れた衣料を得ることができる。

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